

SHIP PRODUCTION COMMITTEE
FACILITIES AND ENVIRONMENTAL EFFECTS
SURFACE PREPARATION AND COATINGS
DESIGN/PRODUCTION INTEGRATION
HUMAN RESOURCE INNOVATION
MARINE INDUSTRY STANDARDS
WELDING
INDUSTRIAL ENGINEERING
EDUCATION AND TRAINING

October 1999
NSRP 0526
N8-96-3

THE NATIONAL SHIPBUILDING RESEARCH PROGRAM

Application of Industrial Engineering Techniques to Reduce Workers' Compensation and Environmental Costs - Deliverable J

U.S. DEPARTMENT OF THE NAVY
CARDEROCK DIVISION,
NAVAL SURFACE WARFARE CENTER

in cooperation with
National Steel and Shipbuilding Company
San Diego, California

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DELIVERABLE J

WORKSHOP PRESENTATION

WORKSHOP SUMMARY

To communicate the findings of the project “Application of Industrial Engineering Techniques to Reduce Workers’ Compensation and Environmental Cost,” three workshops were held. The first workshop was held at the Radisson Admiral Semmes Hotel in Mobile, AL October 8 & 9, 1998. The second was held at the Radisson Hotel in Portland, ME, October 15 & 16, 1998. The third was held at National Steel & Shipbuilding Company in San Diego, CA, October 22 & 23, 1998.

The workshops were scheduled in central locations throughout the country, to facilitate attendance by all of the major shipyards and repair facilities. These workshops were advertised through NSnet and an e-mail discussion group of more than 500 members. The advertising for these workshops was coordinated through the University of Michigan by Pamela Cohen. There were an additional 367 flyers mailed to members of the NSRP panels (3, 8, 9, 5 and 7) by the Project Engineer. The advertising and mailings occurred during the months of August and September to notify participants in a timely manner. A copy of the workshop announcement flyer is included in this report.

The workshop was conducted by Freddie Hogan, Project Engineer, Brienn Woodds, Manager of Training and Development, Karen Wasson, Training and Development Department and Michelle Lee, Environmental Department. The workshop agenda and workshop material are included in this report.

The workshops were well received by the attendees and provided a valuable opportunity to share the lessons learned on this project.

WorkShop

on

"Application of Industrial Engineering Techniques to Reduce Workers' Compensation And Environmental Costs"

This event is hosted by National Steel & Shipbuilding Company.

When: October 8 & 9, 1998 • Radisson Admiral Semmes
Hotel • Mobile, Alabama

October 15 & 16, 1998 • Radisson Eastland
Hotel • Portland, Maine.

October 22 & 23, 1998 • National Steel &
Shipbuilding Company • San Diego, Ca.

Topics:

Behavioral Based Safety

*Back Injury Reduction for Blasters, Painters,
Electricians, and Steel Trades.*

Environmental Tracking Software

Environmentally Compliant Spray Equipment

..... and more.

*To reserve your space in any of the workshops or for more information
please contact Fred Hogan at 619/544-8501 or Brienn Woods at
619/544-7967.*

*Note: For attendess at the San Diego workshop, please call to arrange entry
into the shipyard.*

Application of Industrial Engineering Techniques to Reduce Workers' Compensation and Environmental Costs

Freddie Hogan

National Steel & Shipbuilding Co.

Industrial Engineering

Definition:

Integration of human, information, material, monetary and technological resources to produce goods and services; ensuring workers have the correct tools and training to get the job done efficiently, safely and with high quality.

Techniques

- Process Planning
- Ergonomics
- Process Control
- Training
- Industrial Safety
- Operations Research

Project Overview

Approach

- The project was divided into components
 - Workers' Compensation costs
 - Environmental issues

Workers' Compensation Approach

- A safety process improvement team was chartered to address all aspects of workers' compensation costs
- Safety PIT identified high frequency or high risk of severity work areas.
 - Three areas were identified for further evaluation to reduce injuries and costs.
 - A sub-PIT of salaried and hourly workers was formed to review and analyze the causes of injury for each area

Project Overview

- Central process improvement team established with department heads from:
 - Safety Department
 - Paint & Blast
 - Human Resources
 - Training
 - Steel Erection
 - Electrical
 - Finance

Workers' Comp Cost Background

- \$17 million spent in 1996
- Paint & Blast department spent \$1.4M in 1996 on hand, wrist, shoulder injuries
 - Repetitive motion injury rate at 15%
 - On-Block injury rate at 11%
 - Dept. injury rate at 38%
- Electrical department spent \$130,000 from 1996 to 1998 on back injuries
 - Injury rate for cable crew at 127%
- Steel erection area averaged \$1.4M yearly on back injuries
 - Injury rate for steel erection at 42%

Workers' Compensation Sub PITs

- Paint & Blast
- Electrical
- Steel Erection

Paint & Blast Sub PIT

- Initial Team
 - Department Mgr.
 - Facilitator
 - Industrial Hygienist
 - Safety Dept. Mgr.
 - Quality Assurance
 - Production Supervisors
 - Hourly Employees
 - General Supervisor
 - Engineer
- Research Team
 - Facilitator
 - Engineer
 - General Supervisor
 - Production Supervisors
 - Industrial Hygienist
 - Quality Assurance

Paint & Blast Dept. Charter

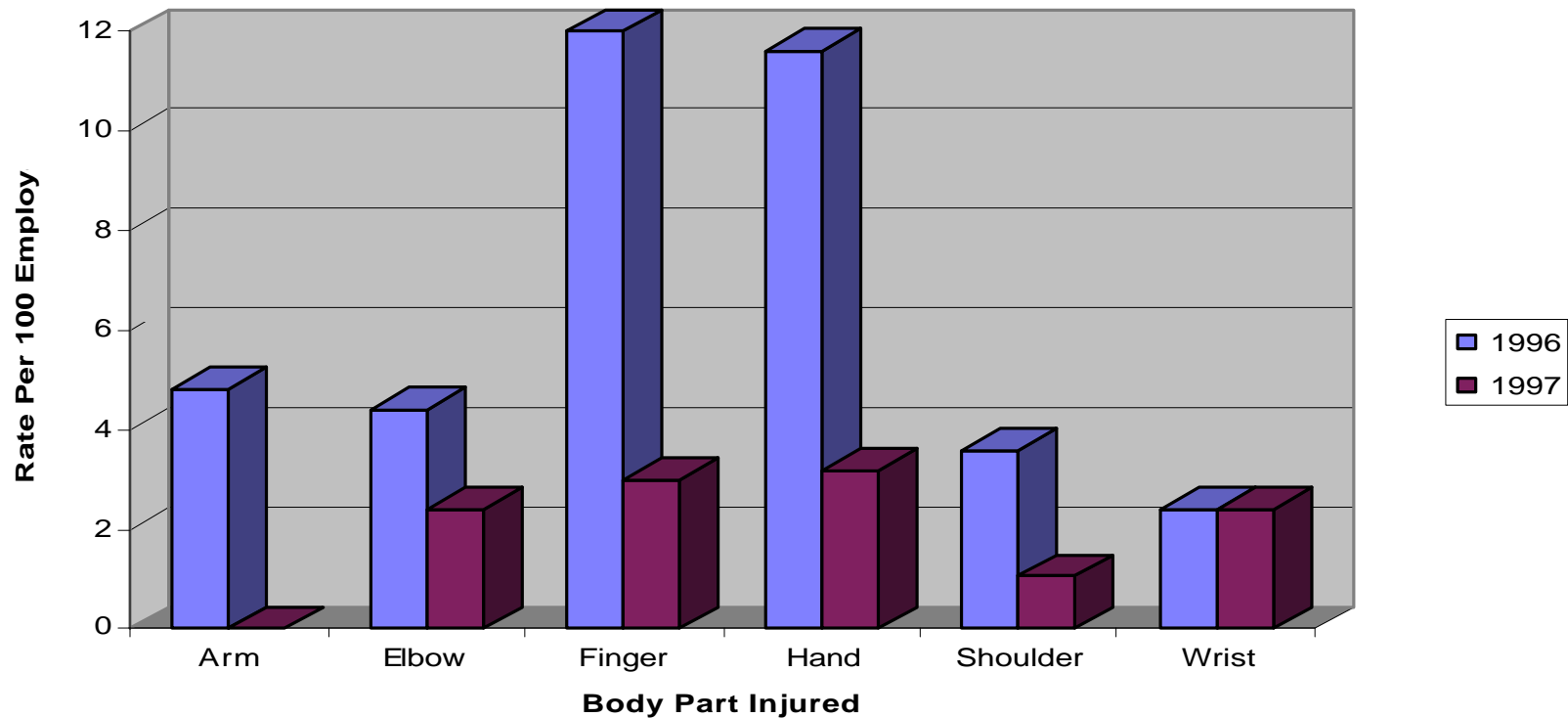
- The Process Improvement Team (PIT) was established to study the causes of hand, wrist and arm injuries while performing mechanical cleaning.
- The following stages of construction were analyzed:
 - Sub Assembly
 - Assembly
 - On-Block
 - On-Board
 - Blast Pit

Paint & Blast Department Action Plan

- Reviewed 1994-1997 workers' comp. data
 - injuries vs. years of service
 - injuries by age group
 - body part injured
 - repetitive injuries by type
- Reviewed First Report of Injury from safety dept.
- Brainstormed ideas
 - 23 ideas selected
 - 6 areas chosen for study
 - Weighted vote on all priorities

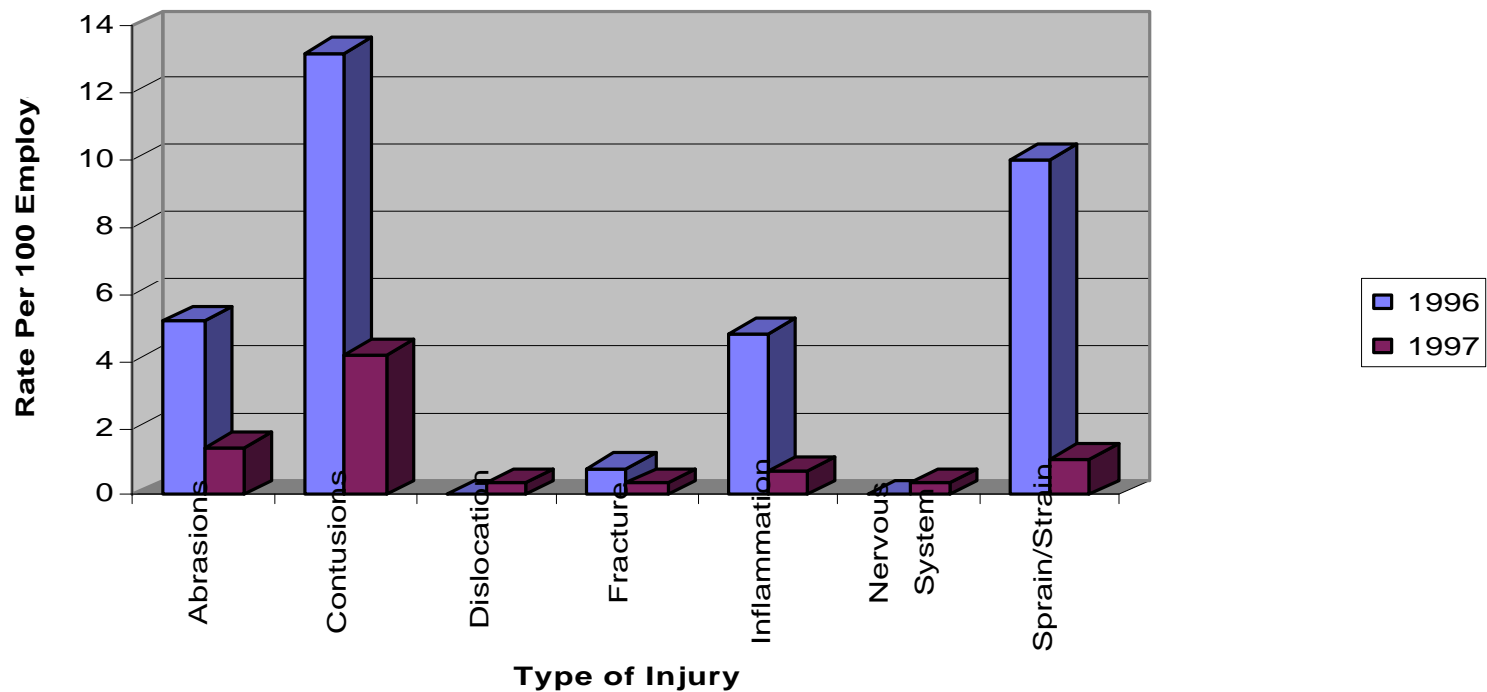
Paint & Blast Department

1996/1997 Paint & Blast Department Injury Rate Per 100 Employees



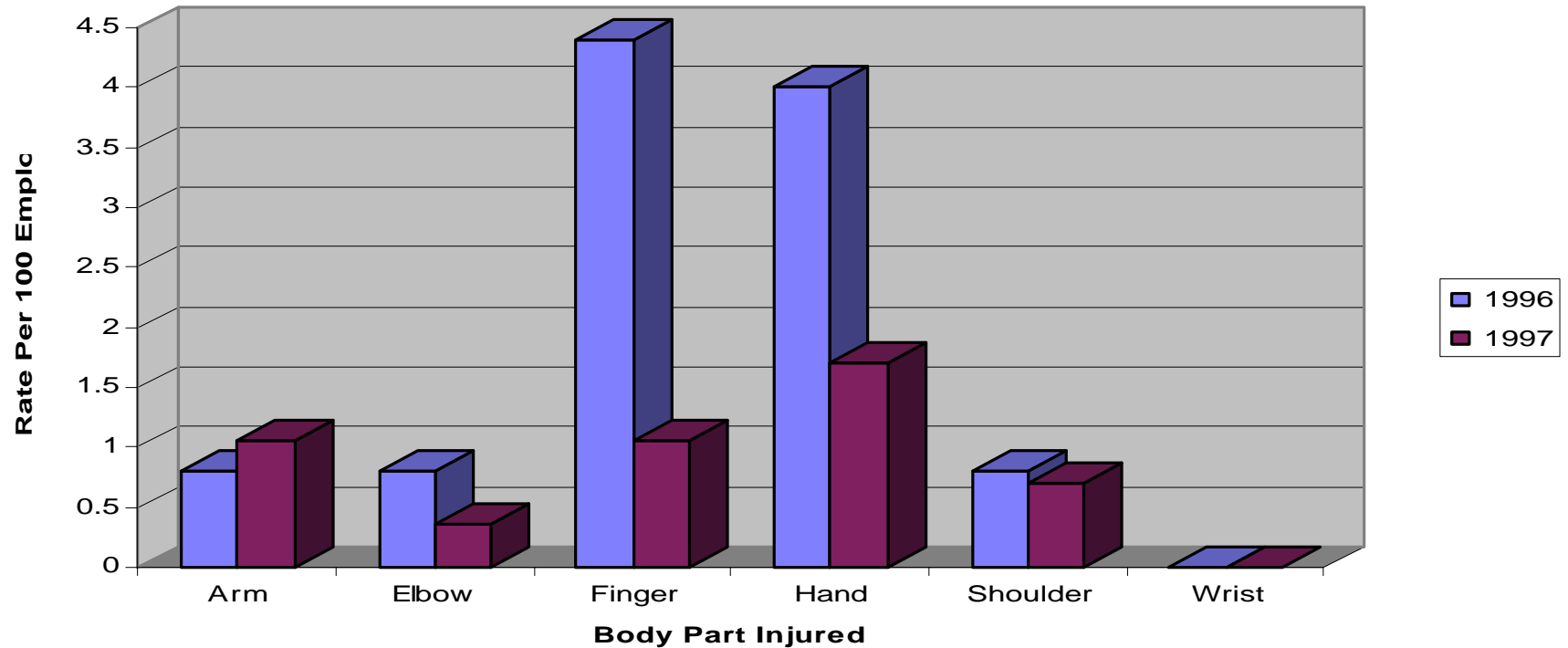
Paint & Blast Department

1996/1997 Paint & Blast Department Repetitive Injuries Per 100 Employees



Paint & Blast Department

1996/1997 On-Block Injury Comparisons Per 100 Employees



Paint & Blast Sub PIT

Action Plan

- Conduct employee interviews
 - employees with hand/arm/wrist injuries
- Conduct observations
 - proper vs. improper handling techniques
 - ergonomics
- Review of power tools & equipment
 - buffers & grinders
 - gloves
 - abrasives
- Review mechanical cleaning process

Paint & Blast Department

Buffer/Grinder Issues

Old Tool

- Three shift operation
- Manufacturer redesign
- Grease/bearing issues
- Improper tool usage
- Icing on buffers
- Wire wheels/danger
- Buffer/Grinder too large

New Tool

- Lightweight
- Ergonomic **Handles**
- Faster speed
- Durability
- Smaller design

Paint & Blast Department

Abrasive Issues

Different abrasives needed with new equipment

- Lighter abrasives to match new buffers/grinders

- Better abrasives provide less time of equipment usage for employees

- 5 degree req'd instead of 15 degrees

- Light weight back-up pads

Would eliminate two steps from current process

Longer usage than current abrasives

Paint & Blast Department

Power Tool Training

- Norton Abrasive Company
- Mandatory for any industry that uses abrasives
 - Two day training sessions
 - All production shifts involved
 - 20 painters & blasters per class

Paint & Blast Department

Glove Issues

- Existing Equipment
 - NASSCO supplied
 - Cotton
 - Leather
 - Other Options
 - Safeguard Technologies
 - Customized design
 - Therapy Specialist support
- Requirements
 - Waterproof
 - Cold/thermal insulation
 - Long life/durability
 - Comfort/fit
 - Anti-vibration
 - Non-slip surface
 - Ergonomic design
 - Wrist support

Paint & Blast Department

Spray Equipment

- Equipment
 - Airless guns
 - Conventional guns
 - Electrostatic guns
 - Air-assisted airless guns
 - HVLP guns
 - Air-assisted electrostatic guns
 - Plural component units
- Compliance Issues
 - Transfer efficiency
 - Solvent usage
 - High solids paints
 - Waste reduction
- Costs
 - Equipment costs
 - Compliance costs

Paint & Blast Department Compliant Spray Equipment

- Electrostatic
 - Principles
 - Primers & metallic coating
 - Waterborne coatings
 - Compatible paint solvent
 - Versatility
 - Operator comfort, ergonomic considerations

Paint & Blast Department

Compliant Spray Equipment

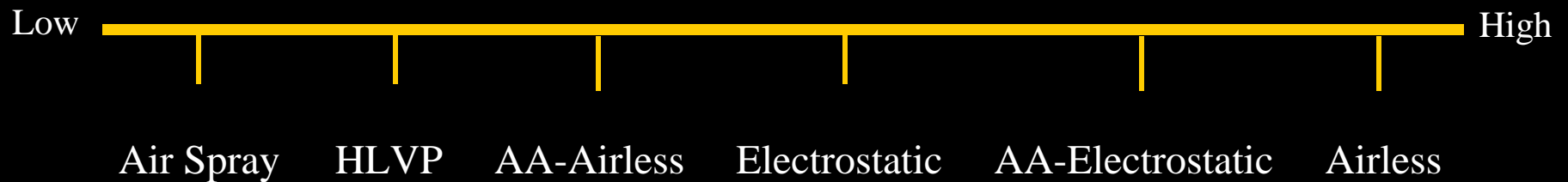
- Electrostatic usage areas
 - Exterior surfaces; bulkheads, decks, side shells, interior storage spaces, cargo areas, etc.
- Air-assisted airless usage areas
 - In all areas where current usage of airless guns are used

Paint & Blast Department Compliant Spray Equipment

- High volume low pressure guns
 - Can be used in areas where current usage of conventional spray is used
- Air-assisted airless electrostatic guns
 - More versatility than regular electrostatic guns to spray areas where Faraday cage effect is of concern

Productivity and Transfer Efficiency Ranking

Productivity



Transfer Efficiency



Paint & Blast Department Compliant Spray Equipment

- Plural component units usage and benefits
 - Some restriction on location & placement
 - Use in immediate areas of paint operation
 - Reduce manpower required to replenish spray pots
 - Utilizes less paint
 - 60% solvent reduction
 - Less space required
 - 50-70% more efficient

Paint & Blast Department

- Transfer efficiency rates:
 - Electrostatic 45-75%
 - AA-Airless 70%
 - Airless 20-40%
 - Conventional 15-30%
 - HVLP 50-75%
 - AA-Electrostatic 70-90%

Paint & Blast Department

Eye Injury Issues

- High frequency of first aid injuries
- Usage of full face cartridge respirators vs. goggles and eye glasses
- Reduced set-up by 30 minutes per painter
- Reduced safety hazards because fewer airlines attached to employee
- Major contributor eye injury reduction in department

Paint & Blast Department Accomplishments in 1997

- Generated cost savings of \$1.2M
- Repetitive motion injury reduction of 87%
- On-block injury rate reduction of 55%
- No compensation cases for eye injuries
- Design of new anti-vibration glove
- Lighter, ergonomically improved power tools for paint & blast department
- Reduction of CTD's by 70%

Electrical Sub PIT

- Team Membership
 - Team Leader
 - Safety Representative
 - Production Supervisors
 - Working Foreman
 - Leadperson

Electrical Sub PIT Charter

To analyze the causes of sprain and strain injuries among electrical employees and to develop methods of prevention

Electrical Sub PIT

Action Plan

- Brainstorming to determine
 - Root cause analysis
 - Aggravating conditions that contribute to sprain and strain
 - Identify internal and external factors
- Reviewed research material
- Reviewed workers' compensation and safety department data

Electrical Sub PIT Brainstorm Results

- Root causes of sprain/strain injuries
 - Surge of effort
 - Beyond range of motion
 - Biomechanics
 - Diminished range of motion with age

Electrical Department Analysis

- **External Factors**

- Outside distractions
- Emotional problems
- Lack of sufficient rest
- Lack of training
- Body size
- Pre-existing medical conditions
- Sedentary lifestyle, etc.

- **Internal Factors**

- Cable pulling
- Lifting objects
- Extended reaching
- Working in awkward positions and cramped spaces
- Prolonged effort

Electrical Sub PIT

Action Plan

- **Workplace issues:**
 - Inaccessibility of work spaces
 - Design issues
- **Ergonomics**
- **Equipment**
- **Training**
- **Employee hiring process**

Electrical Sub PIT

Action Plan

- Worksite study of cable crew
- Interviews
- Observations
- Questionnaire
- Stretching program

Electrical Department Results

- New Cable Puller
 - Assisted in manufacturer with design for shipboard use
 - Elimination of individuals needed to pull cable
- Implemented job rotation
- Ergonomic Training
 - Therapy specialist
 - Fisher Safety E.L.A.T.E. Training Program
 - Industrial Hygienist

Electrical Department Results

Back Belt Study

- No injuries reported among each of the test group
- Airbelt is a much better back brace for lifting and pulling
- Training and awareness the key to a successful program

*Back belts don't prevent injuries.
Properly trained employees do, with combination of
back belt and back training*

Electrical Sub PIT

Accomplishments

- Cable crew injury rate decreased:
 - 18.2% in 1996
 - 3.6% in 1997
 - 2.4% current in 1998
- Cable crew injury cost decreased
 - \$170,000
- Electrical dept. injury rate decreased:
 - 2.45% in 1996
 - 0.5% in 1998
- No workers' comp cases for electrical dept. in 1998
- Additional dept. cost decrease
 - \$18,000

Electrical Sub PIT

Additional Accomplishments

- Man hours savings for 1 puller: 22,888/yr.
- Return on investment for cable puller:
 - \$801,064 (for one puller)

By eliminating a process, at-risk work practices are eliminated and increased efficiencies are realized

Steel Erection Sub PIT

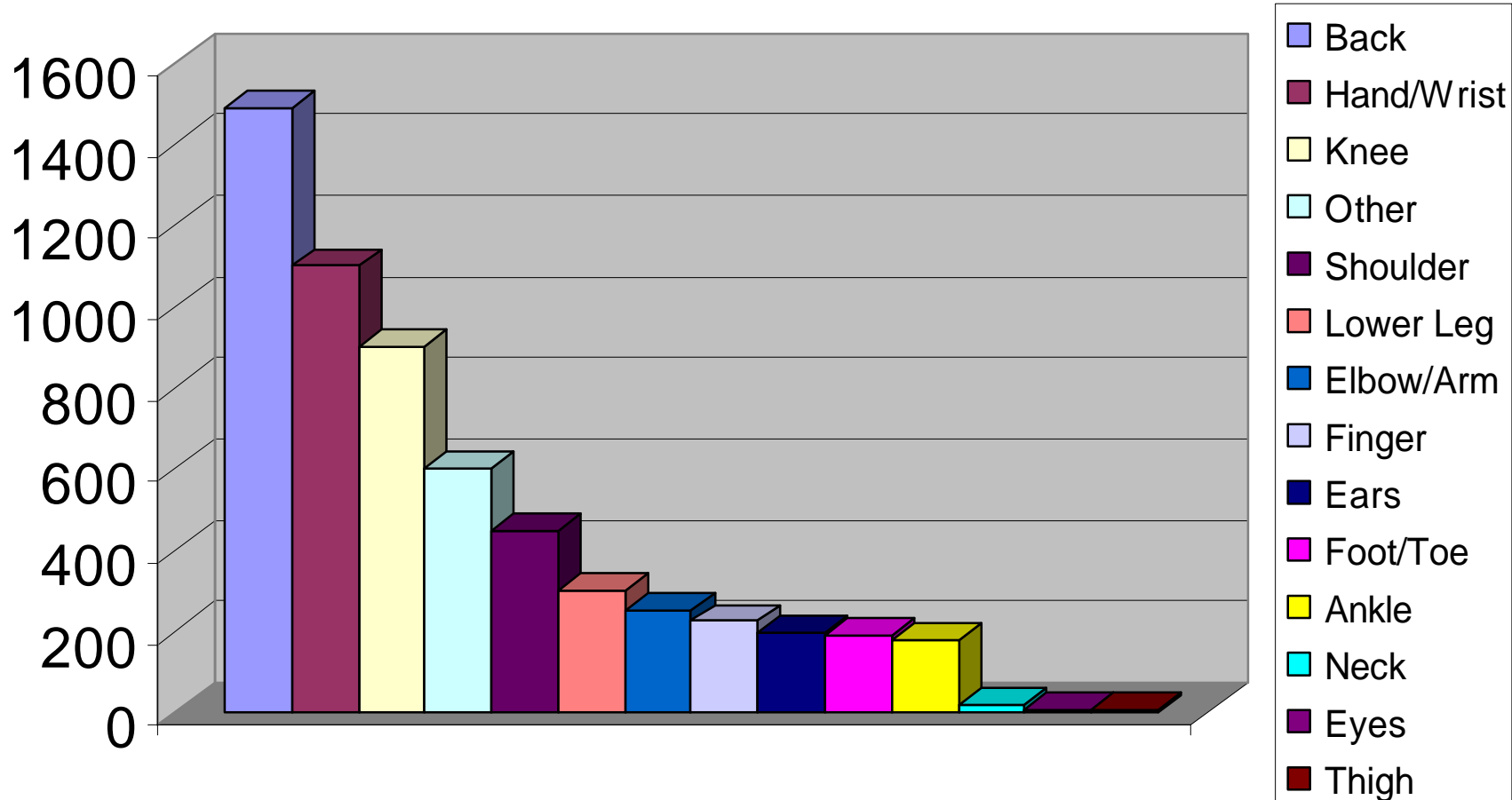
- Team members
 - Five hourly workers
 - Facilitator
 - Department Manager
 - Project engineer
 - Engineer



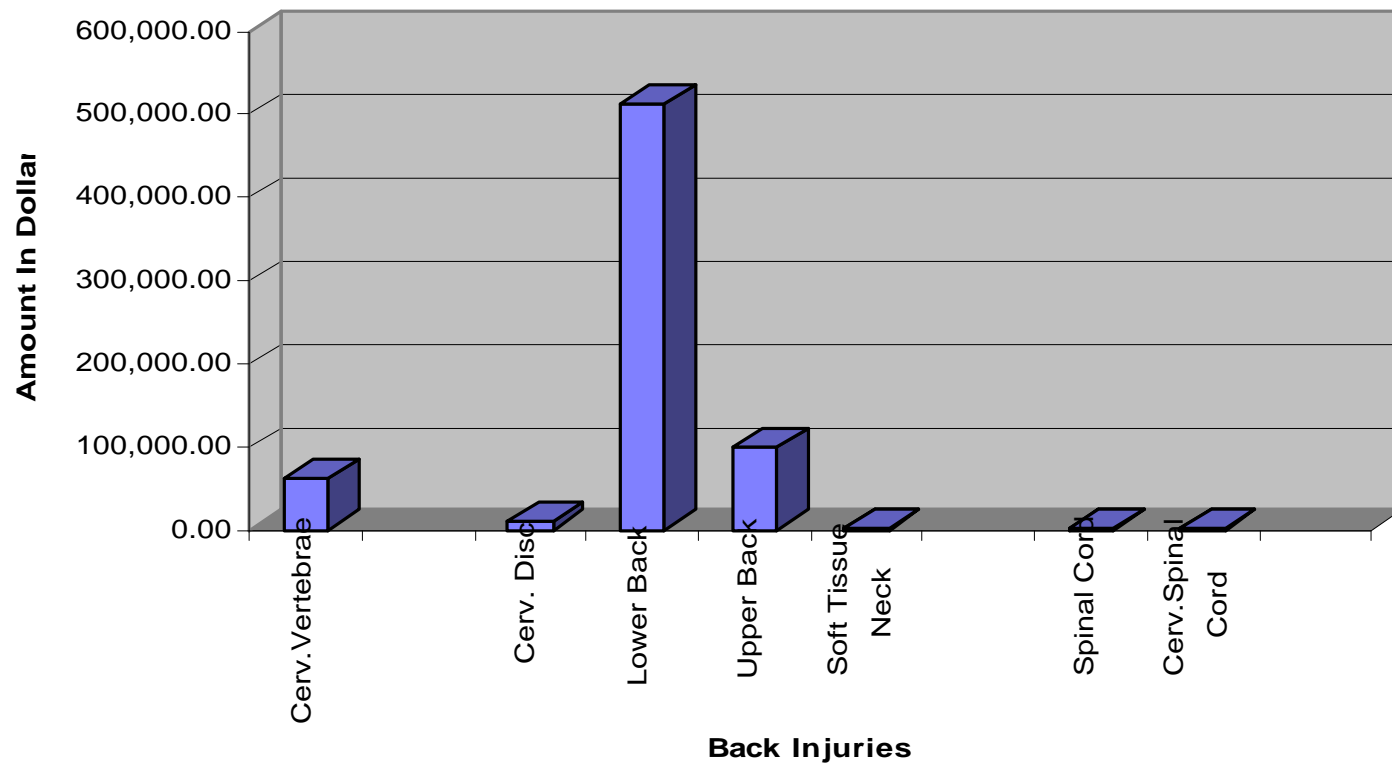
Team Charter

- Review injury data from 1995 to present
- Select re-occurring injury
 - Causes pain and suffering
 - Significant cost impact on the company
- Analyze causes of injury
- Develop recommendations to reduce injury
- Assist in the implementation of recommendations with co-workers

Steel Erection Injury Costs 1995-1996



Steel Erection Back Injuries by Type 1997



Steel Erection

1995 to 1997 Steel Erection Department Claims
First Aid



Tools Used

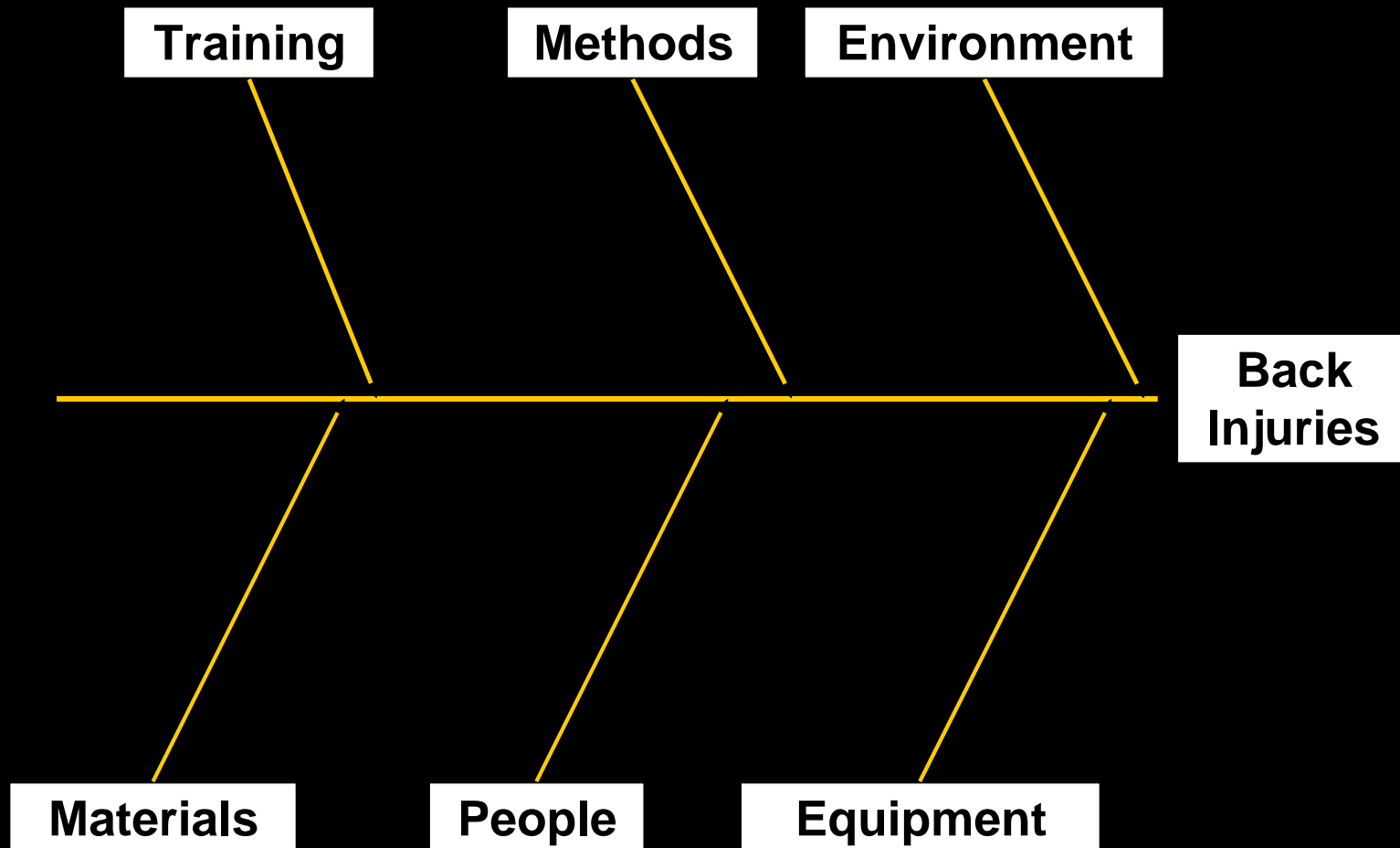
- Job hazard analysis
- Cause and effect diagram
- Behavioral observation and feedback system
- Observation data sheet

Process Used

- DO IT

- Define
- Observe
- Intervene
- Test

Cause and Effect Diagram





Observation Checklist

Observer _____		Date_____
Location _____		
	Safe	Unsafe
Bend knees and use legs		
Keep back straight		
Keep load close to body		
Lift slowly and smoothly		
Get help with heavy loads		
Use tools/equipment to lift		
Build a bridge		

Intervention Methods

- Photos
 - Safe lifting practices
 - Unsafe lifting practices
- Presentation
- Sub PIT members conducted meetings at each site
- Proper lifting training
 - Video
 - Peer conducted

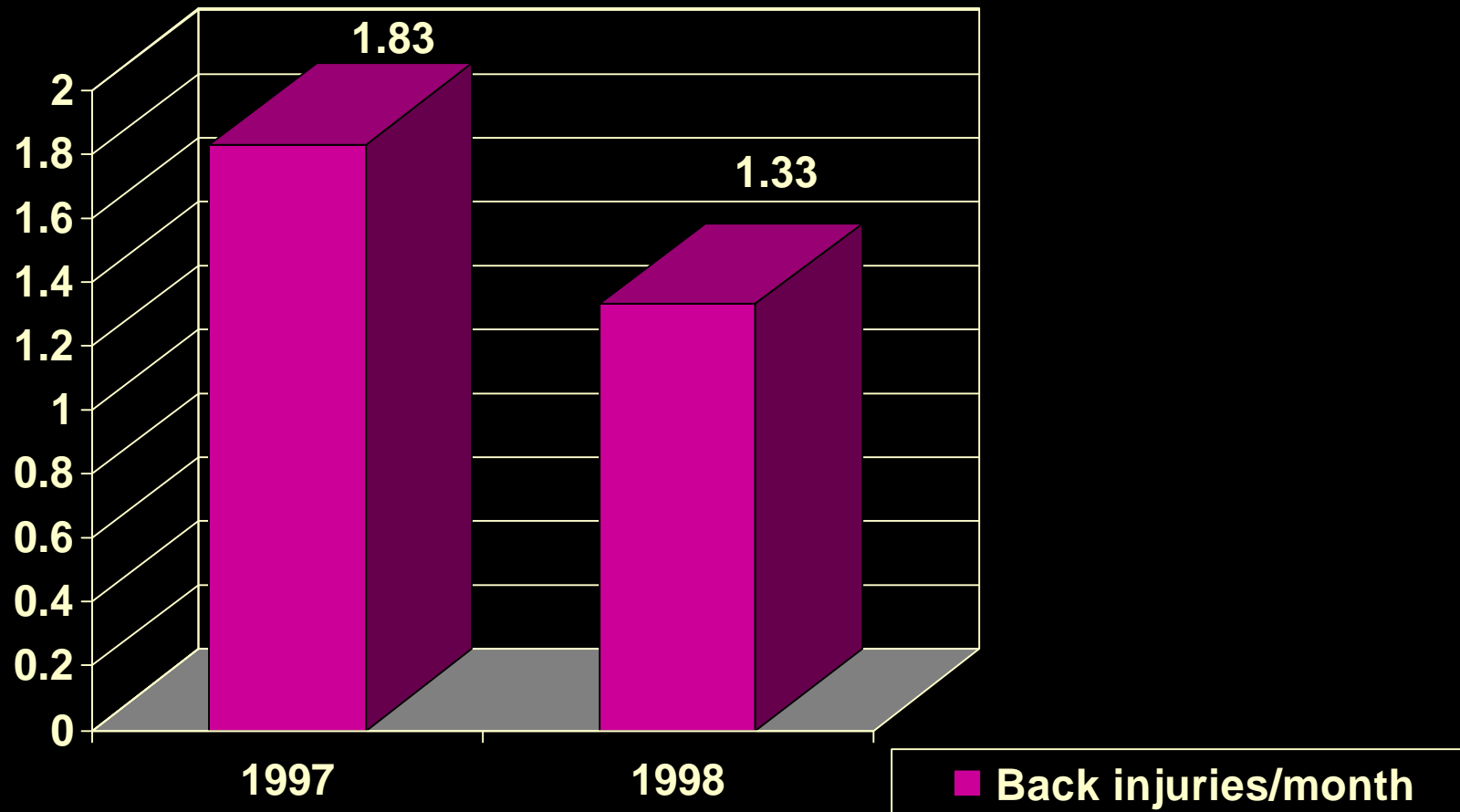
Observation Results

7/97 - 9/97

12/97 - 3/98

	Percent Safe	
	Pre-Intervention	Post-Intervention
Bend knees and use legs	44%	79%
Keep back straight	47%	69%
Keep load close to body	56%	70%
Lift slowly and smoothly	54%	76%
Get help with heavy loads	60%	71%
Use tools/equipment to lift	51%	73%
Build a bridge	N/A	84%
Cumulative Total	51%	71%

Steel Erection Back Injury Data



Recommendations

- Expand PIT to other departments & gain cooperation of fellow workers
- Incorporate back injury prevention into new hire orientation
- Utilize experience from this PIT toward the implementation of company-wide behavior-based safety program

Benefits

- Using ergonomics to reduce lower back injuries, hand, wrist and shoulder injuries.
- Better tools and equipment
- Training
- Techniques for effective observation
- Effective team building skills

Summary

- Different Approach
- Team Structure
- Training
- Management Support
 - Cost
 - Time & Effort

ACHIEVING A TOTAL SAFETY CULTURE THROUGH BEHAVIORAL OBSERVATION AND FEEDBACK

NSRP WORKSHOP

Project #N8-96-3

1998



National Steel and Shipbuilding Company



Company Demographics

- National Steel and Shipbuilding Company is a major ship design, construction and repair company
- Modern industrial facility encompassing 147 acres
- Workforce of approximately 4,500
 - three levels of direct supervision
 - working foreman (bargaining unit employee)
 - production supervisor (salaried employee)
 - general supervisor (salaried employee)

Workshop Objectives

- Understand the importance of using a behavioral science approach in creating a total safety culture
- Identify the components of a behavioral observation and feedback process
- Practice an observation
- Practice giving and receiving feedback

Agenda

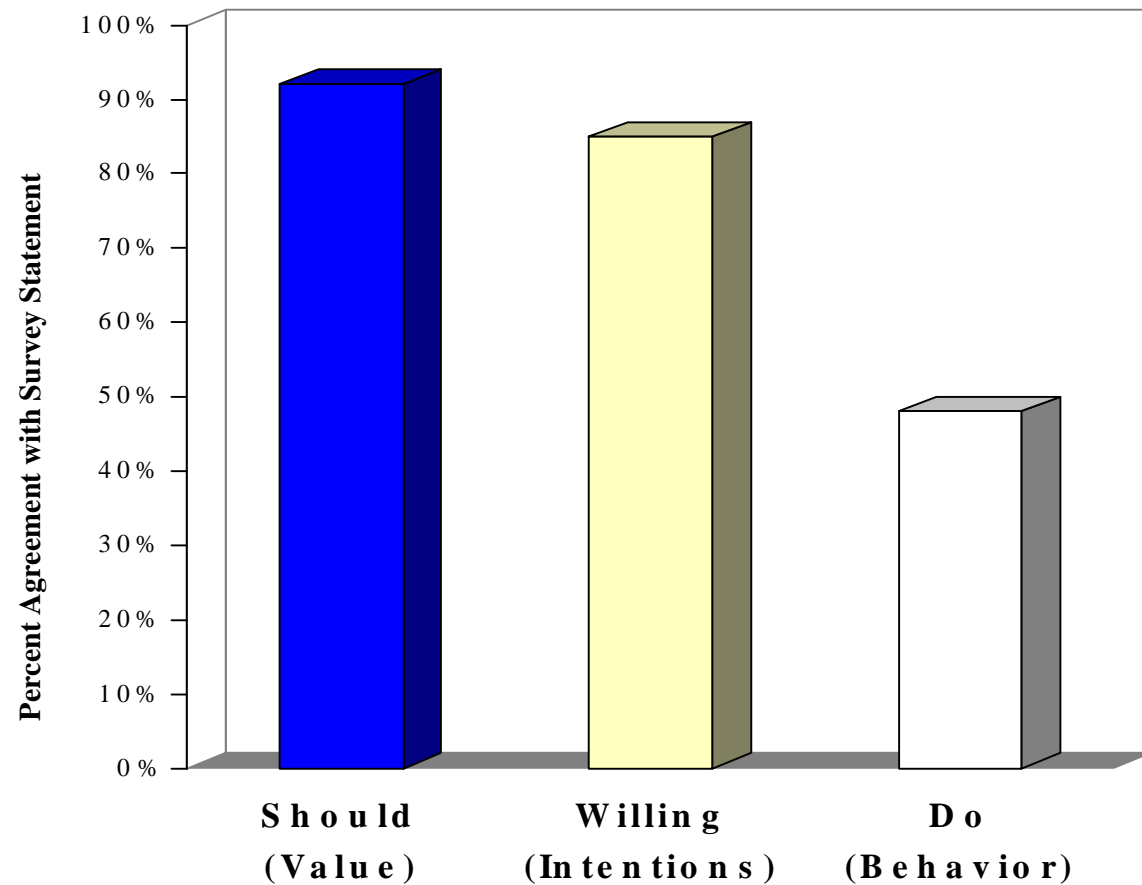
- A Total Safety Culture Overview
 - What it is
 - Why it is important
- Motivation - how it affects you
- The Observation and Feedback Process
- Supervisor Responsibilities
- Giving and Receiving Feedback
- NASSCO's Implementation Approach

The Characteristics of a Successful Total Safety Culture

- Safety is held as a value by all employees
- Each employee feels a sense of responsibility for the safety of their co-worker as well as themselves
- Each employee performs “Actively Caring”
 - Each employee is willing and able to “go beyond the call of duty” for others

Values, Intentions and Behaviors

Cautioning co-workers about performing unsafe acts



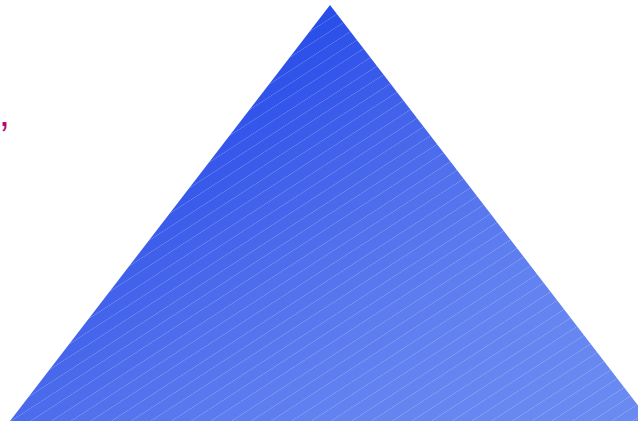
Safety Triangle

Environment

Equipment, Tools, Machines,
Housekeeping, Heat/Cold,
Engineering

Person

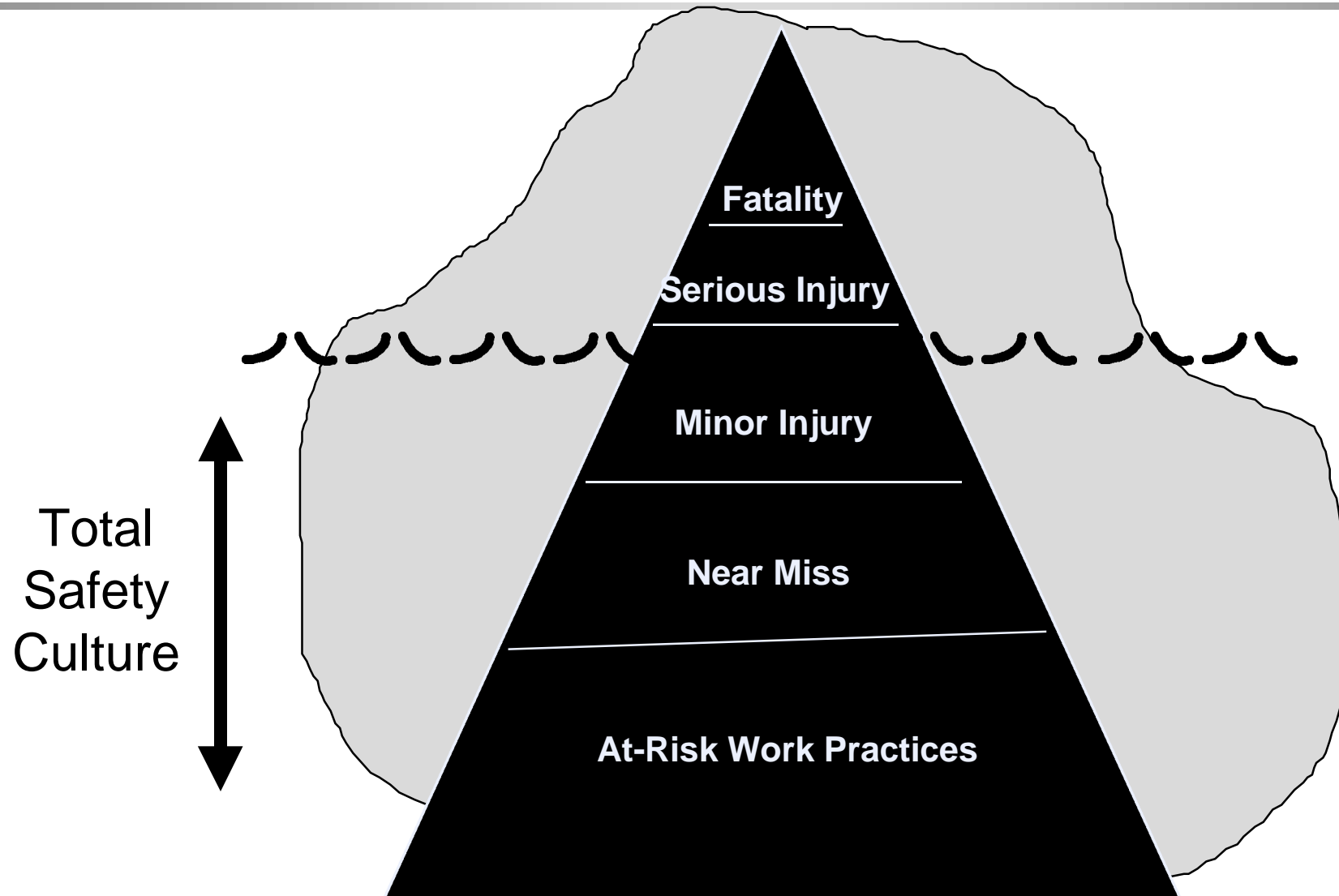
Knowledge, Skills, Abilities,
Intelligence, Motives,
Attitude, Personality



Behavior

Putting on PPE, Lifting property, Following procedures,
Locking out power, Cleaning up a spill,
Sweeping floor, Coaching co-workers

Focus: Accident Prevention



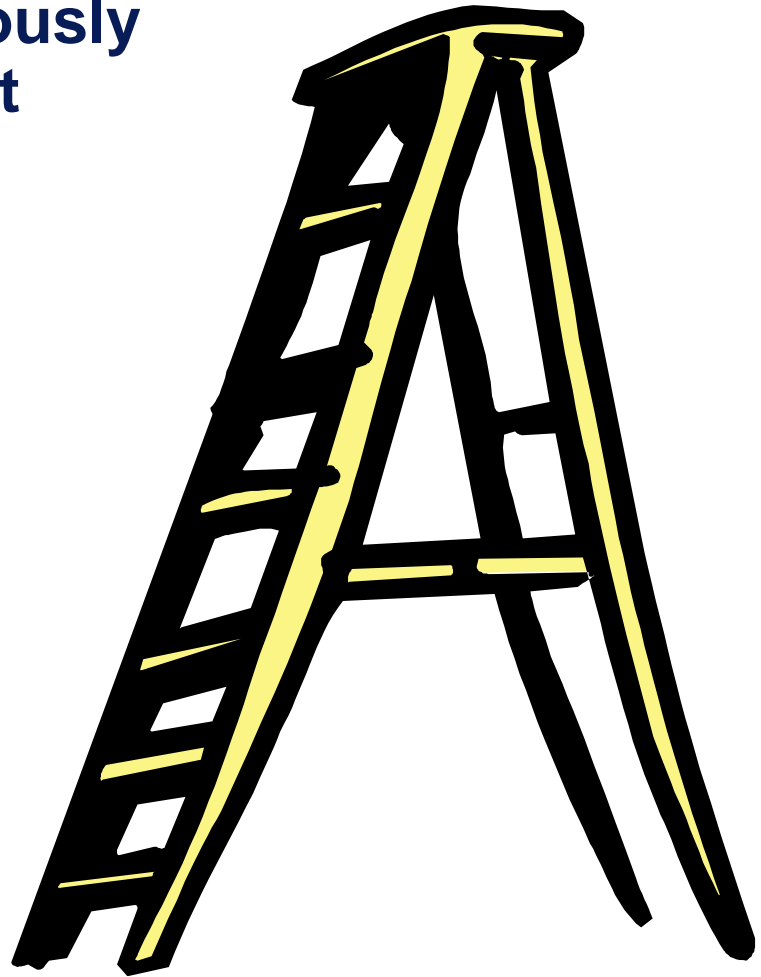
Developing Safe Habits

**Unconsciously
Competent**

**Consciously
Competent**

**Consciously
Incompetent**

**Unconsciously
Incompetent**



Direction Is NOT Enough

Direction

.

Motivation



Behavior

ABC Model

What Motivates Behavior?



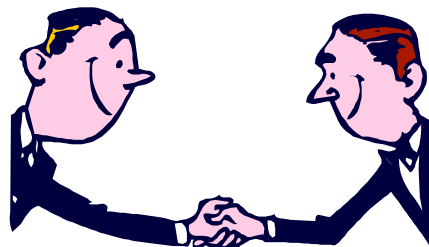
Feedback Influences Work Practices

- Reinforcing feedback increases desired work practices
- Corrective feedback decreases undesirable work practices



Functions of Feedback

- Provides needed information
- Provides social support:
 - co-worker support and acceptance
 - manager/supervisor approval

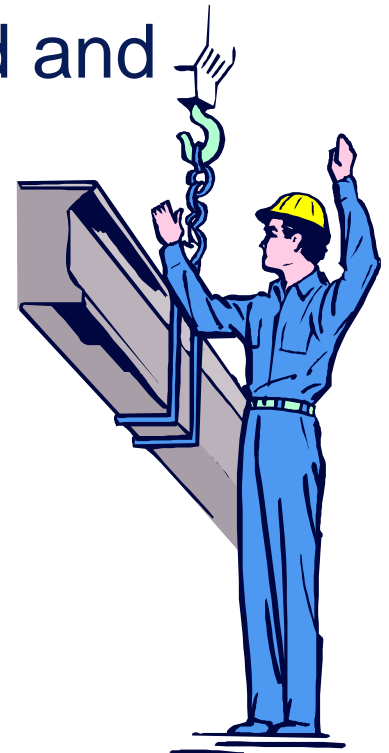


Observation and Feedback Process



Observation and Feedback

- Observation sheet guides the observer
- Observer immediately provides feedback
- Observation sheets collected, compiled and graphed
- Information reviewed with employees
- Information analyzed for follow-up, and
- Problem solving for targeted areas



TSC Data Collection

- Number of observations per week
- Total % of safe work practices per week
- % of safe work practices by category per week
- % of safe per category

NASSCO Observation and Feedback Process

- Tailored to meet the needs of each department:
 - work practices to target
 - design of the observation sheet
 - use of the observation sheet
 - processing and review of data
 - follow-up

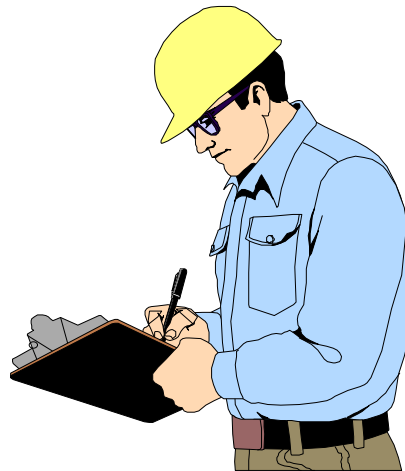


Interaction

More Important Than Data

- There is no “best” approach
- True benefit is in the safety focused interaction
- Feedback should occur whenever an opportunity arises

Observation and Feedback Exercise



Sample Definition Sheet

1.0 Housekeeping (Safety Manual Reference 3.7 CH#5)

- 1.1 Trash, scrap (slag) disposed of
 - Plastic bags/skip tubs/scrap tubs readily available
 - Hazardous material is in proper secondary container and correctly identified with NASSCO product label
- 1.2 Spills, water, and dry absorbent are cleaned up as appropriate
 - There are no oily or slippery substances on the floor
 - Water is cleaned up appropriately for the work area
- 1.3 Material is properly organized
 - Material is neatly stacked when not in use
 - Material lanes not used as storage areas
 - Old and/or obsolete material is disposed of or removed from ship
- 1.4 Walkways are clear and identified
 - Scaffold and staging are considered walkways and should be cleaned as you work
- 1.5 Lines, leads hoses properly routed
 - Dead leads removed
 - Temp services located/available in safe, practical location
 - Does not pose a trip hazard
- Electrical power leads not in water

Sample Observation Sheet

☐ Observation Interrupted *

SIG Follow-up * ☐

NASSCO MASTER OBSERVATION SHEET

Observer _____

Badge # _____

	Safe	At-Risk	NA	Observer Comments
1.0 Housekeeping				
1.1 Trash, scrap, (slag) disposed				
1.2 Spills and water are cleaned up as appropriate				
1.3 Work area is properly organized				
1.4 Walkways are clear and unobstructed				
1.5 Lines, leads, hoses properly routed				
2.0 PPE (Proper PPE and in good condition)				
2.1 Eye and face protection				
2.2 Hand protection				
2.3 Hearing protection				
2.4 Hard hat				
2.5 Shoes and clothing				
2.6 Respirators				
2.7 Other (knee pads, leathers)				
3.0 Body Use and Positioning				
3.1 Proper lifting techniques, gets help if needed				
3.2 Proper body mechanics				
3.3 Walking/climbing/caution on slippery surfaces				
3.4 Line of fire/pinch points				

Video Illustrates Important Points

- Employees still perform at-risk practices
- Observers may notice only a few of the safe and at-risk practices
- Different observers note different practices
- Safe and at-risk can be subjective judgments
- We notice at-risk acts more than safe acts
- We become more systematic with observation sheet
- We improve with practice

Exercise: Video

- Locate video worksheet
- While viewing video, complete the worksheet
- Prepare to share your answers with the class

Guidelines for Receiving Feedback

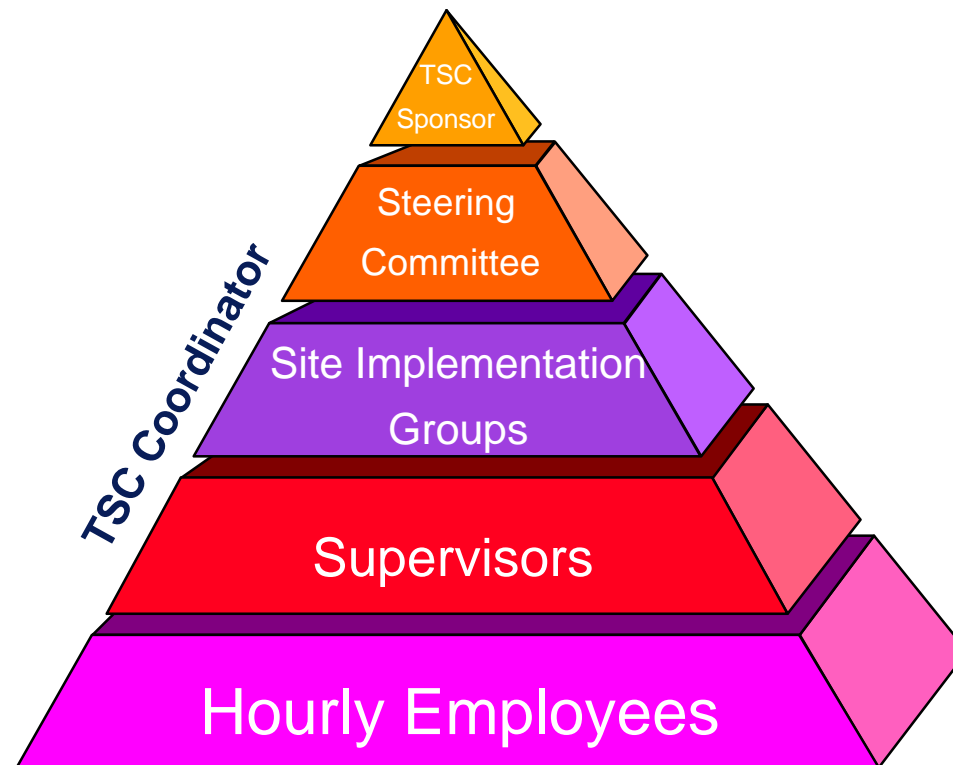
- Be open and receptive
- Think BEFORE you react
- Be objective/not defensive
- Avoid taking a position
- Ask for specifics
- Actively LISTEN
- Work together on potential solutions
- Reach an agreement
- Say thank you

Key Points of TSC

- Creating a Total Safety Culture requires:
 - Safety is held as a value by all employees
 - Each employee feels a sense of responsibility for the safety of their co-worker as well as themselves
 - Each employee performs “Actively Caring”
 - Each employee is willing and able to “go beyond the call of duty” for others
 - An observation and feedback process which reinforces safe behaviors and provides corrective feedback for at-risk work practices

NASSCO's Implementation Approach

Total Safety Culture



Salaried Supervisor's TSC Responsibilities

- Near Miss Reporting
- Accident/Incident Reporting
- Housekeeping
- Observation and Feedback



Observation and Feedback Process

- Supervisors attend 12 hours of TSC training
- Accompany hourly work crews to their 4 hour TSC training
- Conduct 2 observations daily
 - give immediate feedback to employee
 - complete comments section of observation sheet indicating result of feedback session
 - turn in observation sheet for data compilation
- Share information with employees during 5 minute morning meeting
 - overview of observations
 - feedback from Site Implementation Group (SIG)

Area Site Implementation Group

- Supervisors within stage of construction/departement
 - representing trades and shifts
 - leader, note taker and time keeper roles selected
- Role models and champions for TSC
- Develop customized process for their area
- Meet weekly to:
 - assess area progress
 - analyze data
 - take action on at-risk items
 - develop action plans
- Provide feedback to supervisors, employees, Area SIG sponsor

Central SIG

- Area SIG leaders meet monthly to:
 - share TSC best practices throughout yard
 - provide resource and support for each other
 - share lessons learned
 - brainstorm solutions for problem situations
 - recommend changes to processes or policy to Steering Committee

Lessons Learned to Date

● Successes

- involving SIG members in making presentations during the training sessions create their early buy-in
- improved communication between employees and supervisors
- better awareness of at-risk conditions; action being taken to correct
- cooperation between areas to resolve at-risk conditions

● Improvements made

- restructure to move the decision making and ownership to the lowest level possible
- include more safe and at-risk examples in training sessions using pictures and videos of employees working
- streamlining data collection and reporting (this is a continuous effort and one we need help with)

Supporting Structure

The following pages give an
outline of our overall process
key responsibilities

Area SIG Sponsor

- Provide support and resources to Area SIG
- Ensure on-going operational success of TSC process
- Review, evaluate and approve recommendations from Area SIG
- Serve on Steering Committee

Steering Committee Charter

- Review, evaluate and approve as appropriate recommendations from Central SIG
- Ensure ongoing operational success of Total Safety Culture Process
- Oversee SIG's to ensure consistency of application of TSC principles
- Address all yard-wide safety related issues generated from a Steering Committee member or other external source
- Isolated issues referred back to the affected SIG for consideration and recommendations under the normal SIG process
- Members are Area SIG sponsors
- Members meet monthly; special meetings may be called by the Steering Committee Chairperson, as needed

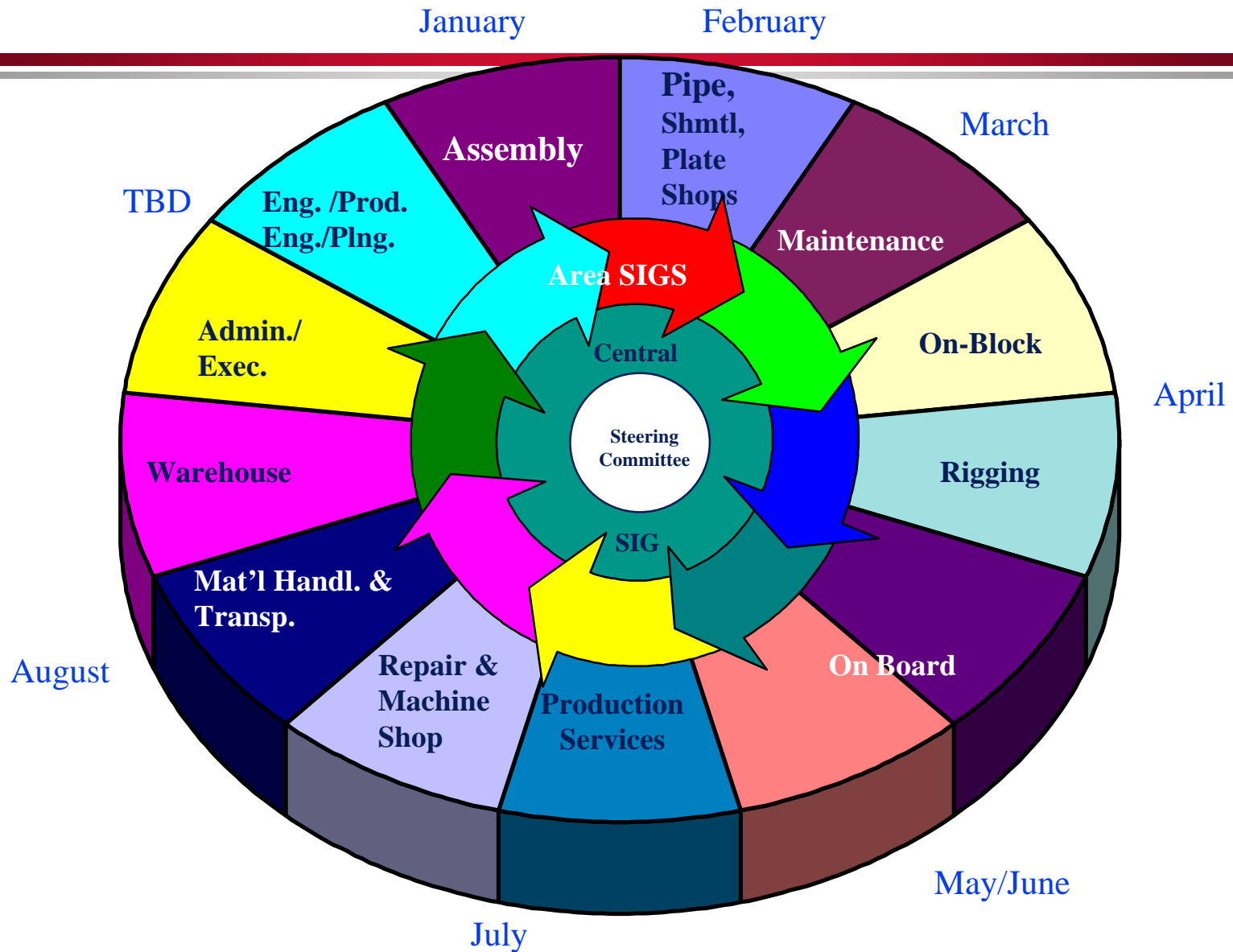
Management Sponsors

- Champion the yard-wide TSC process
- Steering Committee and TSC Coordinator report results
- Provide guidance and support for Steering Committee
- Liaison with Executive Staff

TSC Coordinator

- Oversight for all training activities and materials
 - Steering Committee
 - Supervisor
 - SIG
 - Employee
- Facilitate all SIG meetings
- Coordinate data collection and reporting
- Assess process effectiveness, recommend changes as appropriate
- Liaison with consultant

TSC Group / Area Breakdown





Computer Based Training Module

*Application of Industrial Engineering
Techniques to Reduce Workers
Compensation and Environmental Costs*

N8-96-3



Objective

- To provide a computer-based training (CBT) module on environmental awareness issues that impact the shipyard operation and production.
- Training to meet regulatory requirements
 - Cost effective, “JIT” Training



Problem Statement

- No cost effective method for environmental regulatory re-training
- Most training sessions impact:
 - Production man-hours
 - Instructor efficiency

Solution

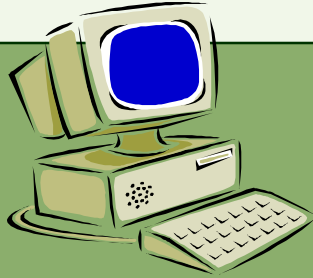
- Development of customized computer based training (CBT) module aimed towards shipyard specific training issues:
 - US Coast Guard, Clean Water Act, Clean Air Act



Potential Benefits

- Trainees can schedule the training at their convenience to meet individual needs
- Trainees can work at their own pace
- The module meets regulatory requirements
 - Can easily be modified to meet changing regulations
- Cost effective (requires no trainer)
- Training consistency

CBT Development



**P-233, Windows NT
64MB Ram
6GB HD
Video Capture Card
Diamond Monster Video
Card w/ 8MB
Smart & Friendly 426
External CD RW**

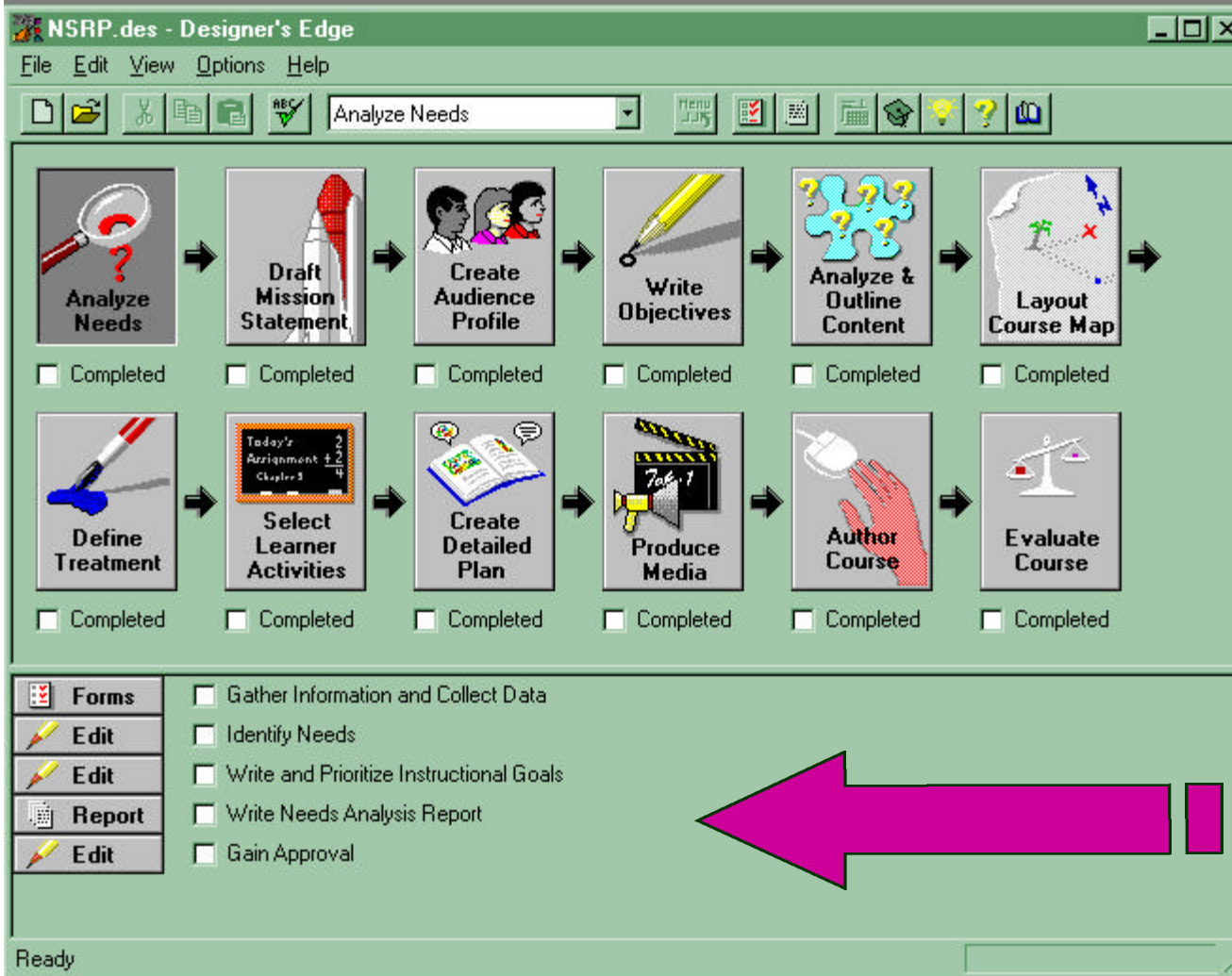
- **Macromedia's Authorware Studio Suite**
 - Complete studio:
Authorware, Director, Xres,
Backstage, Sound Editing
 - #1 in market
 - Automatic conversion
feature for WWW
 - Many outside training
courses, help groups, etc.

Designer's Edge Software

- A course writing tool from Allen Communication
- Takes Instructional Designer step-by-step through course writing procedures
 - Stand up training or CBT
 - Consistency
 - Thorough
 - Easily updated

Let's take a look!

Designer's Edge Main Screen



The 12-step process that leads you through course designing, following ISD principles.

These are the sub-task items that need to be completed under the “Analyze Needs” icon.

Designer's Edge

NSRP.des - Designer's Edge

File Edit View Options Help

Analyze Needs

Form

- Common Error Analysis
- Core Curriculum Review
- Expert Analysis Form
- Focus Group**
- Knowledge Assessment Tool Form
- Observation Form
- One-on-one Interview
- Organizational Goals Analysis
- Performance Data Summary Form
- Questionnaire
- Skills, Knowledge and Attitude Analysis
- Standardized Test Data Form
- Task Analysis Form

Generate Form

Focus Group

Needs Analysis

Interviewer name: _____

Date: _____

Brief description of group: _____

Number of participants: _____

1. Have the group list their likes and dislikes about training.

Likes	Dislikes

Focus Group

Needs Analysis

Interviewer name: _____

Date: _____

Brief description of group:

Number of participants: _____

1. Have the group list their likes and dislikes about training.

Likes

Dislikes

2. Ask for recommendations to improve existing training. (Write down all comments)

3. What types of training do you like best? (Say the name of each training type aloud. Have the group raise their hands for any of training methods that they like--group members will probably respond to more than one training type)

Training Types

Responses

Instructor-led Classroom
On-the-Job Training (OJT)
Field Trips
Video Tapes
Workbooks
Job Aids
Computer-based Training
Independent Study
Study Groups
Observing Others
Simulations
Other:



4. What do you need to know to do your job well? (Make a list)



5. What do "expert performers" do that "novice performers" do NOT do? (Make a list)
6. What are the most common/frequent problems you face on the job? (Make a list, preferably one that all in the group can see.)
7. By vote, rank the problems from the most troublesome to the least troublesome.

<u>Problem List (from most to least troublesome)</u>	<u>Rank</u>
--	-------------

8. Tell me a "war story" about some of the most troublesome problems and how they affect your job performance. (Record any stories)
9. What is it about your job that changes the most? (List any answers)
10. What stays the same? (List any answers)
11. What tricks do you use to learn and remember something?



13. What do you like most about your job? (Make a list)

14. What do you like least about your job? (Make a list)

15. What motivates you to do your best work? (Make a list)

16. What would help you become more productive on the job? (Make a list)

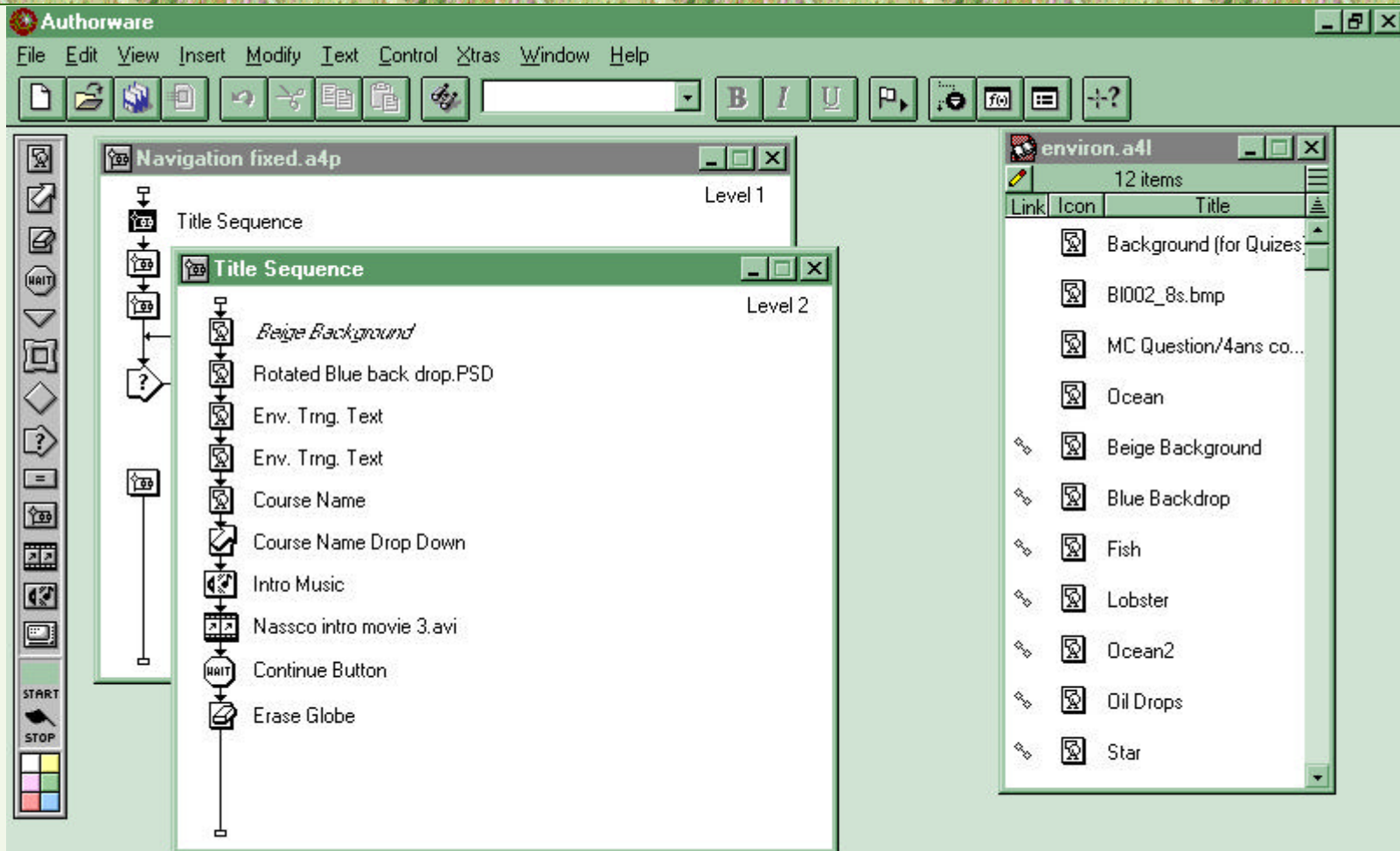
Authorware

The screenshot displays the Authorware software interface. The main window shows a navigation map for a file named "Navigation fixed.a4p" at "Level 1". The map includes a "Title Sequence" leading to a "Menu Display", which then leads to "Menu Topics". From "Menu Topics", a "Menu Selections" node branches into five paths, each leading to "Information Pages". The "Menu Selections" node is currently selected, and a list of navigation actions is visible: "Nav. to Introduction", "Nav. to Pollution Prevention", "Nav. to NASSCO Ops Manuel", "Nav. to NASSCO PIC Designation", and "Nav. to Safety Concerns".

On the right side, a media library window titled "environ.a4l" shows 12 items. The library is organized into a table with columns for "Link", "Icon", and "Title".

Link	Icon	Title
		Background (for Quizes
		BI002_8s.bmp
		MC Question/4ans co...
		Ocean
		Beige Background
		Blue Backdrop
		Fish
		Lobster
		Ocean2
		Oil Drops
		Star

Authorware



Notes from CBT slides

#6

The Authoring PC

P-233, Windows NT: Choose a good PC. Faster IS better.

64MB Ram: Important if you think you'll be digitizing video, or rendering graphics. Minimum RAM requirements 32MB.

6GB HD: You'll need the space! Especially important for digitizing video! I chose a SCSI model, allowing faster data transfer.

Video Capture Card: Allows you to transfer video from a camcorder or VCR to a digital format.

Diamond Monster Video Card: Good all-around card. The extra memory on card helpful for digitizing and rendering graphics.

Smart & Friendly CDR/RW: CD Recorder/Rewrite. Used to burn CD's for your library of projects. This brand is middle of the road in cost, excellent quality. I highly recommend it for anyone looking at a CDR or CDR/RW. Note: If you think you'll be burning a good quantity of CD's, purchase an external model. This type of equipment can get very hot, and you don't want that extra heat inside the case of your PC!

Macromedia Authorware Suite- *a Complete Solution*

Authorware: The main authoring program. Utilizes a flowchart technique to author, making it powerful, yet easier to use program.

Director: Another authoring program. The most powerful authoring tool of all. Director requires extensive training to use all features, and it's files can be imported into Authorware files.

Xres: A graphic authoring application.

Sound Edit: A sound file authoring or modifying application.

Backstage: Used for WWW page authoring.

#8

The Main Screen

The program utilizes 12 "steps" to design your training module.

- The upper half of main screen contains 12 large icons representing sequential steps to follow when creating your course.
- The lower half of screen contains icons and check boxes that pertain to each of the 12 steps. Use the check-boxes to give a "complete" status to each sub-task before proceeding to next step in process.

#9

Forms needed to gather information are included in D.E. The program will automatically generate your choice of form using your Word Processing application. All forms can be customized....or you can create your own.

#13

Authorware

- The larger window contains the basic course. Opening any of these "mapped" icons will show that there are multiple levels of programming contained within.

- The smaller window on the right contains a common library of graphic files that were used in multiple locations throughout the course. This library helps cut down on the size of your finished project.

#14

- Opening the Title Sequence mapped icon reveals the programming that went into the one screen of information.

Hazardous Waste Tracking Software Evaluation & Implementation at NASSCO

*Application of Industrial Engineering
Techniques to Reduce Workers
Compensation and Environmental Costs*

N8-96-3

Objectives

- ☛ Identify efficient methods of tracking costs and volume of hazardous and non-hazardous wastes using industrial engineering techniques
- ☛ Shift from manual tracking to computer automated process system
- ☛ Implement waste minimization techniques based on cost reduction

Objectives

- ☛ Institute a network system accessible by shipyard departments
- ☛ Track all hazardous waste generators within shipyard
- ☛ Provide database for inventory reports for the management and environmental regulatory agencies

Deliverable

- ✿ Written report on selection and implementation of the tracking software system

Software Selection Criteria

- ☛ Allow to track waste activities from generation to disposal
- ☛ Allow easy and efficient tracking of waste containers
- ☛ Ability to allocate waste volume and disposal costs to each generating department
- ☛ Ability to integrate all related data into one program

Software Selection Criteria

- ☛ Ability to track and maintain current and archived data
- ☛ Ability to generate reports for regulatory agencies
- ☛ Inexpensive
- ☛ User friendly
- ☛ Run on IBM based computer systems

Wixel ExecuTrax

- NASSCO purchased the multi-user license for \$5,100
- NASSCO also purchased the technical support contract for \$1,100 annually

Wixel Hardware Requirements

- ☛ PC (386 or greater)
- ☛ 4MB RAM (8MB recommended)
- ☛ 20MB available hard drive space
- ☛ Windows 3.1 or greater
- ☛ VGA Color Monitor
- ☛ Mouse

Projected Benefits

- ☛ Reduction in the biennial hazardous waste report preparation time
 - 80 Hours to 8 Hours (approx.)
- ☛ Ease of hazardous waste generator fee and tax calculation
- ☛ Increased efficiency of the waste management information tracking
- ☛ Ability to integrate into an environmental management system